Mixed convection boundary layer flow past an isothermal horizontal circular cylinder with tempera-dependent viscosity.

ABSTRACT

The problem of steady laminar mixed convection boundary layer flow past an isothermal horizontal circular cylinder placed in a viscous and incompressible fluid of temperature-dependent viscosity is theoretically considered in this paper. The partial differential equations governing the flow and heat transfer are shown to be non-similar. Full numerical solutions of these governing equations are obtained using an implicit finite-difference scheme known as the Keller-box method. The solutions are obtained for various values of the Prandtl number Pr, the mixed convection parameter λ and the viscosity/temperature parameter θ_r. The obtained results show that the flow and heat transfer characteristics are significantly influenced by these parameters.

Keyword: Mixed convection; Boundary layer; Horizontal circular cylinder; Temperature-dependent viscosity.